Small Business Innovation Research/Small Business Tech Transfer

Photocatalytic and Adsorptive System for Odor Control in Lunar Surface Systems Using Silica-Titania Composites, Phase I

Completed Technology Project (2009 - 2009)

Project Introduction

The proposed work herein focuses on waste subsystems with emphasis on odor control associated with volatile organic compounds (VOCs). The development of efficient odor removal systems for use inside lunar mission architectures is one of NASA's critical needs (Topic X2.03). Because of the limited space and resources in both exploration vehicles and non-moving habitats, it is important for a treatment system to be compact, lightweight, and robust, and have low energy and material input requirements with the ultimate focus on reducing equivalent systems mass (ESM). Professors at the University of Florida have developed a novel, robust, and highly effective Silica-Titania Composite (STC) capable of adsorbing and oxidizing VOCs to harmless byproducts. The technology has been licensed by Sol-gel Solutions, LLC. In preparation for the design and fabrication of a prototype for validation in a relevant environment during a Phase II study, the evaluation and optimization of two potential configurations employing the STC is proposed. One configuration would employ continuous UV irradiation, and the other would employ intermittent UV. The ultimate goal is to determine which configuration results in a lower Equivalent Systems Mass (ESM).

Anticipated Benefits

The STC technology is applicable to several non-NASA applications. For example, the technology can be used to remove VOCs from indoor air in commercial buildings, homes, hospitals, and schools. It may also be used by the military for air purification in submarines and aircraft. The technology is currently being developed for use in commercial aircraft cabin air purification. Significant work has been done in the development of the technology for methanol removal from gaseous exhaust at pulp and paper mills. Furthermore, the STC technology has been commercialized for mercury removal from caustic exhaust at a chlor-alkali facility, and a pilot-scale study is scheduled for mercury removal from coal-fired power plant flue gas.

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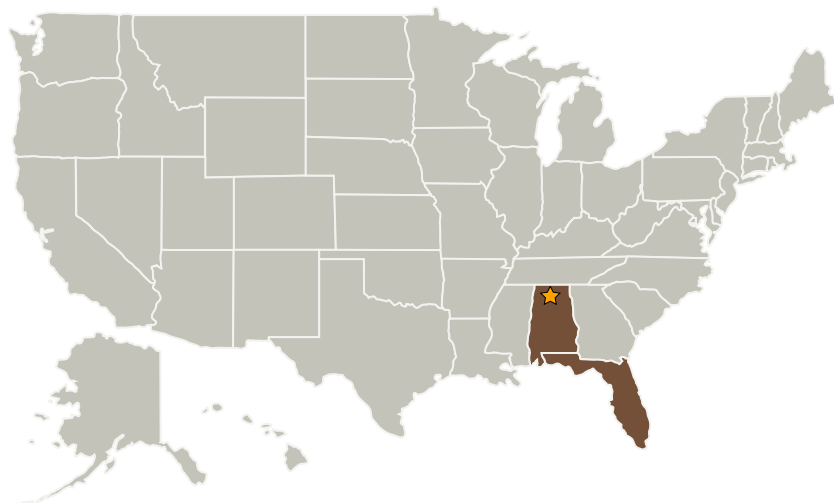
Table of Contents

Primary U.S. Work Locations and Key Partners

Organizations Performing Work	Role	Type	Location
⭐Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Sol-gel Solutions, LLC	Supporting Organization	Industry	Gainesville, Florida

Primary U.S. Work Locations	
Alabama	Florida

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Jay L Perry

Principal Investigator:

Anna Casasus

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Page 2

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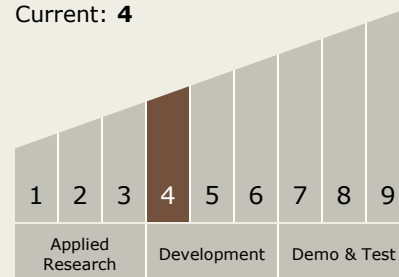
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Technology Maturity (TRL)

Start: **4**
Current: **4**

1	2	3	4	5	6	7	8	9

Applied Research | Development | Demo & Test

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  └ TX07.1 In-Situ Resource Utilization
      └ TX07.1.2 Resource Acquisition, Isolation, and Preparation